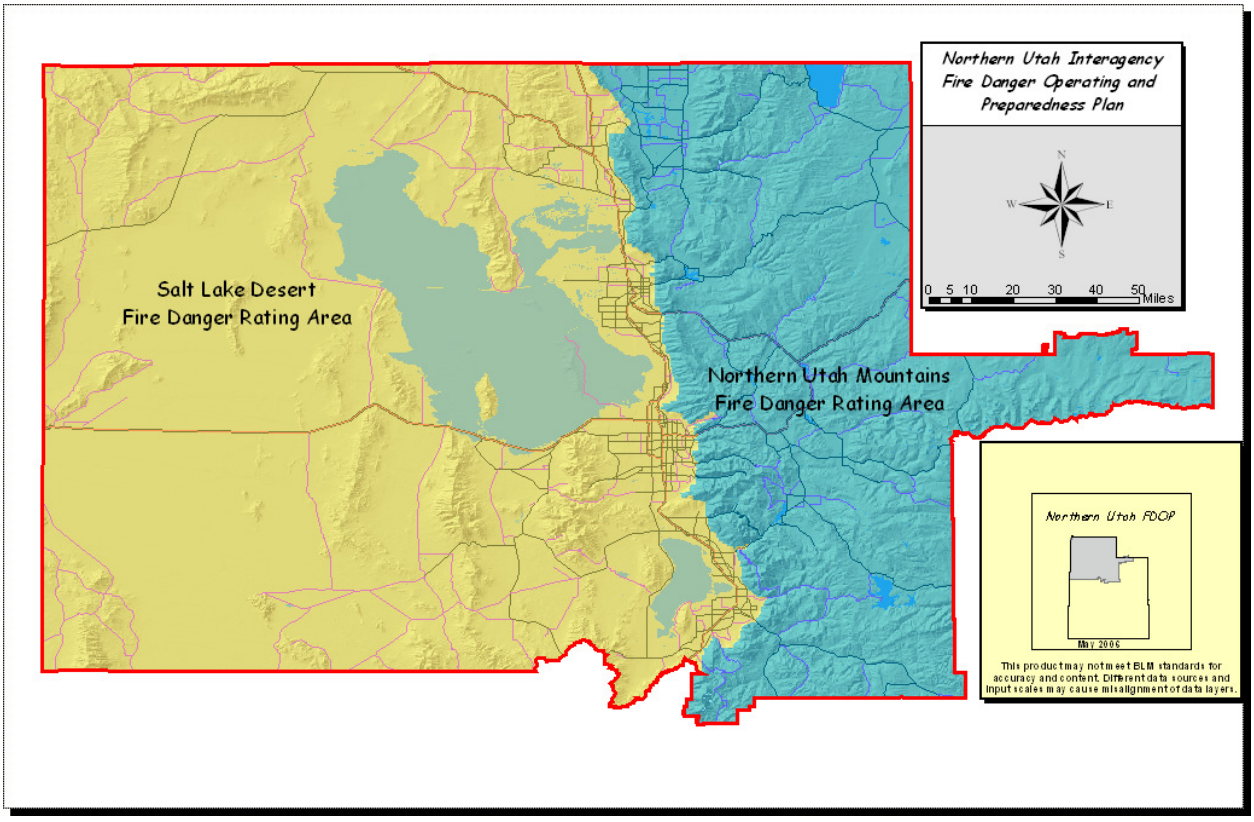
Northern Utah
Interagency
Fire Danger Operating and Preparedness Plan



Bureau of Land Management
USDA Forest Service
State of Utah

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Northern Utah Interagency
Fire Danger Operating and Preparedness Plan

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I. Introduction

Each Agency (BLM, USFS, and State) must maintain an appropriate level of preparedness to meet wildland fire management objectives. Preparedness is based upon the assessment of fuels and weather conditions utilizing the National Fire Danger Rating System (NFDRS). This Fire Danger Operating Plan (FDOP) documents the establishment and management of the Northern Utah interagency fire weather system and incorporates NFDRS fire danger modeling into fire management decisions. In addition, this plan combines an Operating Plan with a Preparedness Plan for the three primary wildland fire management agencies in Northern Utah (BLM, USFS, and State). Guidance and policy for development of a Fire Danger Operating and Preparedness Plan can be found in the BLM/USFS *Standards for Fire and Aviation Operations* and *Forest Service Manual 5120.*

This plan simplifies the decision-making process for agency administrators, fire managers, dispatchers, agency cooperators, and firefighters by establishing agency planning and response levels using the best available scientific methods and historical weather/fire data. In addition, this plan outlines procedures for developing seasonal risk analysis and defines fire severity trigger points. Most importantly, this plan addresses the *Thirtymile Fire Accident Prevention Action Items* by providing the direction necessary to convey fire danger awareness to fire management personnel of escalating fire potential. This awareness is critical when wildland fire danger levels are at severe thresholds which may significantly compromise safety and control.

II. Objectives

A. Provide a tool for agency administrators, fire managers, dispatchers, agency cooperators, and firefighters to correlate fire danger ratings with appropriate fire business decisions in Northern Utah.
B. Delineate fire danger rating areas (FDRAs) in Northern Utah with similar climate, fuels, and topography.
C. Establish a fire weather-monitoring network consisting of Remote Automated Weather Stations (RAWS) which comply with NFDRS Weather Station Standards (PMS 426-3).
D. Determine fire business and adjective fire danger rating break points using the Weather Information Management System (WIMS), National Fire Danger Rating System (NFDRS), Fire Family Plus software, and by analyzing historical weather and fire occurrence data.
E. Define roles and responsibilities to make fire preparedness decisions, manage weather information, and brief fire suppression personnel regarding current and potential fire danger.
F. Ensure that agency administrators, fire managers, cooperating agencies, industry, and the public are notified of the potential fire danger.
G. Provide guidance to interagency personnel outlining specific daily actions to take at each preparedness level.
H. Identify seasonal risk analysis criteria and establish general fire severity thresholds.
I. Identify the season-ending event using the Term module of the Rare Event Risk Assessment Process (RERAP).
J. Develop and distribute fire danger pocket cards to all personnel involved with fire suppression activities within the Northern Utah Fire Danger Rating Areas.
K. Identify program needs and suggest improvements for the Fire Danger Operating and Preparedness Plan.

III. Inventory and Analysis

In order to apply a system which will assist managers with fire management decisions, the problems must be inventoried and analyzed to determine the most appropriate system which will adequately address the issues.

A. Involved Parties

This plan will affect a wide range of entities. However, they can be grouped into three categories:

1. **Agency:** Employees of the federal, state, and local governments involved in the cooperative effort to suppress wildland fires. This includes BLM, USFS, and State of Utah employees, along with volunteer fire departments and military personnel.
2. **Industry:** Organizations that either utilize the natural resources or have permitted activities on federal, state, or private wildland for commercial purposes. These entities or activities include ranchers, hazardous material disposal sites, railroads, timber harvesting, filming, ski resorts, building construction, etc.
3. **Public:** Individuals who use the land for recreational purposes such as off-highway vehicle (OHV) use, camping, hiking, fishing, skiing, firewood gathering, mountain biking, or general travel. This group also includes those living within the wildland/urban interface.

B. Agency, Public, and Industry Interaction

The following matrix demonstrates the differences between the target groups (Agency, Industry, and Public). The ability to regulate, educate, or control a user group will be based upon the interface method and how quickly they can react to the action taken. In addition, each action will result in positive and/or negative impacts to the user groups. Consequently, the decision tool which would be most appropriate would depend upon the sensitivity of the target group to the implementation of the action.

Involved Party	Action	Controllability	Interface Method	Potential Positive Impacts	Potential Negative Impacts	Decision Tool
Agency	Initial Attack (IA) response	Moderate/High	Radio Telephone Fax E-mail Internet	Successful IA	Accidents/incidents	Burning Index
	Automatic Dispatch of Initial Attack Resources			Resource(s) effective	Resource(s) not essential for successful IA	Burning Index
	Pre-positioning of Resources			Improved IA capability	Financial Logistical	Energy Release Component
	Suspension of Prescribed Fire Projects			Prevent escaped Rx fires	Missed opportunity to treat fuels	Energy Release Component
	Extended Staffing			Improved IA capability	Financial Logistical	Burning Index
	Wildland Fire Use			Ecological benefits	Public perception	Energy Release Component
Industry	Chainsaw Restrictions	Low/Moderate	Telephone Mail E-mail Face-to-Face Signs Internet	Fire prevention	Political Financial	Energy Release Component
	ORV restrictions			Fire prevention	Political Financial	Energy Release Component
Public	Campground Closures	Low	Newspaper Television Signs Internet Face-to-Face	Fire prevention	Political Financial	Energy Release Component
	Fuelwood Cutting Restrictions			Fire prevention	Political Financial	Energy Release Component
	Campfire Restrictions			Fire prevention	Political Financial	Energy Release Component
	ORV restrictions			Fire prevention	Political Financial	Energy Release Component
	Debris Burning			Fire prevention	Political Financial	Energy Release Component
	Fireworks			Fire prevention	Political Financial	Energy Release Component

C. Fire Danger Rating Areas

The Northern Utah interagency fire danger planning area has two Fire Danger Rating Areas (FDRAs). They are identified as Salt Lake Desert and Northern Utah Mountains. These areas were defined due to their unique and homogeneous fuels, climate, and topographical characteristics.

1. Salt Lake Desert FDRA

a) Location: The Salt Lake Desert FDRA is geographically defined as paralleling the east side of Interstate 15 along the lower bench of the Wasatch Mountains. The southern end borders the Tooele/Juab and Utah/Juab County lines. The western edge of the FDRA is defined by the Utah/Nevada State Line. The northern border follows the Utah/Idaho border. It encompasses a total of approximately 5,100,000 square miles. However, much of this area is comprised of water (Utah and Great Salt Lakes) and military operating areas..

b) Fuels: The fuels complex of the Salt Lake Desert FDRA consists of forbs, perennial grasses, western annual grasses, salt desert shrub, sagebrush, pinyon-juniper, and mixed conifer. Most wind driven wildfires typically grow large due to the significant continuity of Cheatgrass in the area. Although it may appear that NFDRS fuel model A (western annual grass) is the dominate fuel model in this FDRA, it does not necessarily correlate as well as fuel model G with historical fire occurrence. NFDRS fuel model G correlates well with Burning Index for Dispatch Levels and ERC for preparedness levels in this FDRA. Refer to Appendix J for information regarding the Firefamily Plus analysis.

c) Climate: Hot and dry weather typically dominates the Salt Lake Desert FDRA during fire season. Utah is the second driest state in the nation behind Nevada. The temperatures rise to the high nineties, relative humidity drops to the lower teens, and wetting rain events are scarce. Summer weather patterns that affect the area are westerly and southwesterly flows. Westerly flows generally bring hot and dry air into the region with little or no precipitation. The main concern is when low-pressure systems or upper level disturbances pass through the area with enough energy and moisture to initiate thunderstorm activity and erratic winds. Fire activity may be infrequent, but the potential for large fire growth is usually quite high. Southwesterly flows typically bring monsoonal moisture into the region. Fire frequency may increase due to additional thunderstorm activity, but fire growth potential could be lower due to increased moisture. Fires in this FDRA are typically in climate class 1 (Arid/Semi-arid).

d) Topography: The Salt Lake Desert FDRA is made up of basins that are broken up by several mountain ranges that are generally oriented from north to south. The basin terrain is flat and generally accessible by vehicle, while the mountain ranges are steep, rocky, and inaccessible. Generally, fire occurrence in this area is generally in slope class 1.

e) **Fire Occurrence:** From 1994 to 2003 (10 years), the three agencies recorded 2146 fires, which burned approximately 594,000 acres within the Salt Lake Desert FDRA. Approximately 54% of these were lightning caused; 46% human caused. The months of July and August represent the largest percentage of fire activity (61%).

2. Northern Utah Mountains FDRA

a) **Location:** The Northern Utah Mountains FDRA western boundary is geographically defined as paralleling the east side of Interstate 15 along the lower bench of the Wasatch Mountains. The southern edge borders the Utah/Juab and Utah/Sanpete County lines near Nephi, UT. The eastern edge follows the Utah/Wyoming State line on the north half, the Summit/Daggett County line in the middle and The Wasatch/Duchesne county line on the southern portion. The northern border follows the Utah/Idaho border and also including a small area of the Wasatch-Cache National Forest that extends into southwestern Wyoming. The FDRA encompasses a total of approximately 5,100,000 square miles.

b) **Fuels:** The fuels complex of the Northern Utah Mountains FDRA consists of sagebrush, grasses, oakbrush, maple and pinyon-juniper at lower elevations. Lodgepole pine, mixed conifer and aspen are found at higher elevations. Most wind driven wildfires typically grow large due to the continuity of annual grasses (including cheatgrass) in the area. Most fires on the Wasatch front grow large due to preheating of fuels on steep slopes. NFDRS fuel model G correlates well with Burning Index for Dispatch Levels and Energy Release Component for preparedness levels in this FDRA. Refer to Appendix J for information regarding the Firefamily Plus analysis.

c) **Climate:** The climate ranges from high desert to Alpine Forest. Precipitation generally increases with elevation. Lower elevations typically receive 12-15 inches per year with higher peaks receiving up to 60 inches per year. February and April tend to be the wettest months while summer and early fall are typically the driest. Summer temperatures can rise to the 100's at lower elevations and mid eighties at higher elevations. The predominate wind pattern during the fire season is southwest except where modified by local topography. Strong up-canyon winds cause control problems. Relative humidity can drop to the lower teens and occasionally into the single digits. Fires in this FDRA are typically in climate class 2 (Sub humid).

d) **Topography:** Elevations in the FDRA range from 3000 to 12,000 feet. The Northern Utah Mountains FDRA includes two mountain ranges, The Wasatch Range that is generally oriented north to south and The High Uinta Range which is generally oriented east to west. The high Uintas that make up the northeast end of the FDRA are characterized by rolling topography. The Wasatch Front (from Idaho border to Nephi, UT), is characterized by steep canyons. Upper and mid-elevations of the mountains are steep slopes and canyons where fires can make significant runs.

e) **Fire Occurrence:** From 1996 to 2005 (10 years), the three agencies recorded 2175 fires, which burned approximately 89,000 acres within the Northern Utah Mountains FDRA. Approximately 40% of these were lightning caused; 60% were human caused. The months of July and August represent the largest percentage of fire activity (58%).

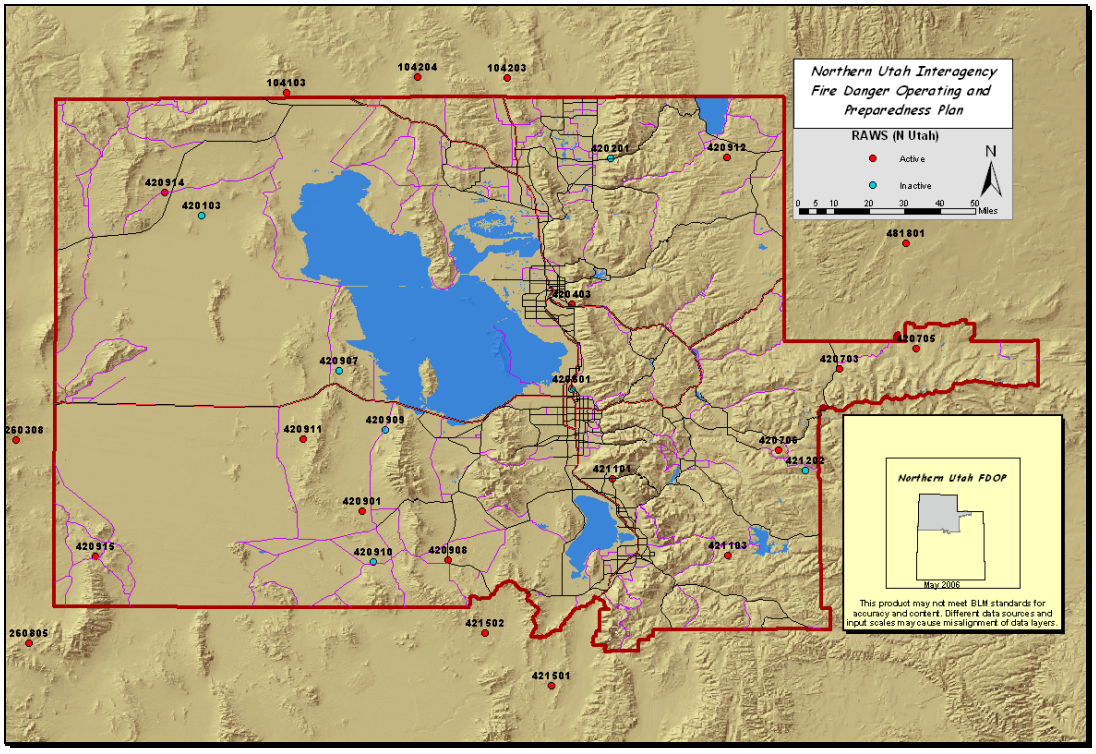
D. Weather Stations

1. Description

The Salt Lake Field Office (BLM) manages six active RAWS: Vernon, Cedar Mountain, Aragonite, Otter Creek, Rosebud, and Clifton Flat. All of these stations comply with NWCG NFDRS Weather Station Standards. The Vernon, Cedar Mountain, Aragonite, and Rosebud RAWS have been combined in WIMS as a Special Interest Group (SIG) to compute an equally weighted set of fire danger indices.

The Wasatch-Cache and Uinta National Forests (USFS) manage six active RAWS: Bear River, Beus Canyon, Hewinta, Norway Flat, Pleasant Grove, and Ray's Valley. All of these stations comply with NWCG NFDRS Weather Station Standards. The Bear River, Norway Flat, Pleasant Grove, Rays Valley, and Beus Canyon RAWS have been combined as a Special Interest Group (SIG) to compute fire danger indices. Refer to Appendix F for a description of database alterations.

2. RAWS Locations and Status (Map)



3. RAWS Summary (Table)

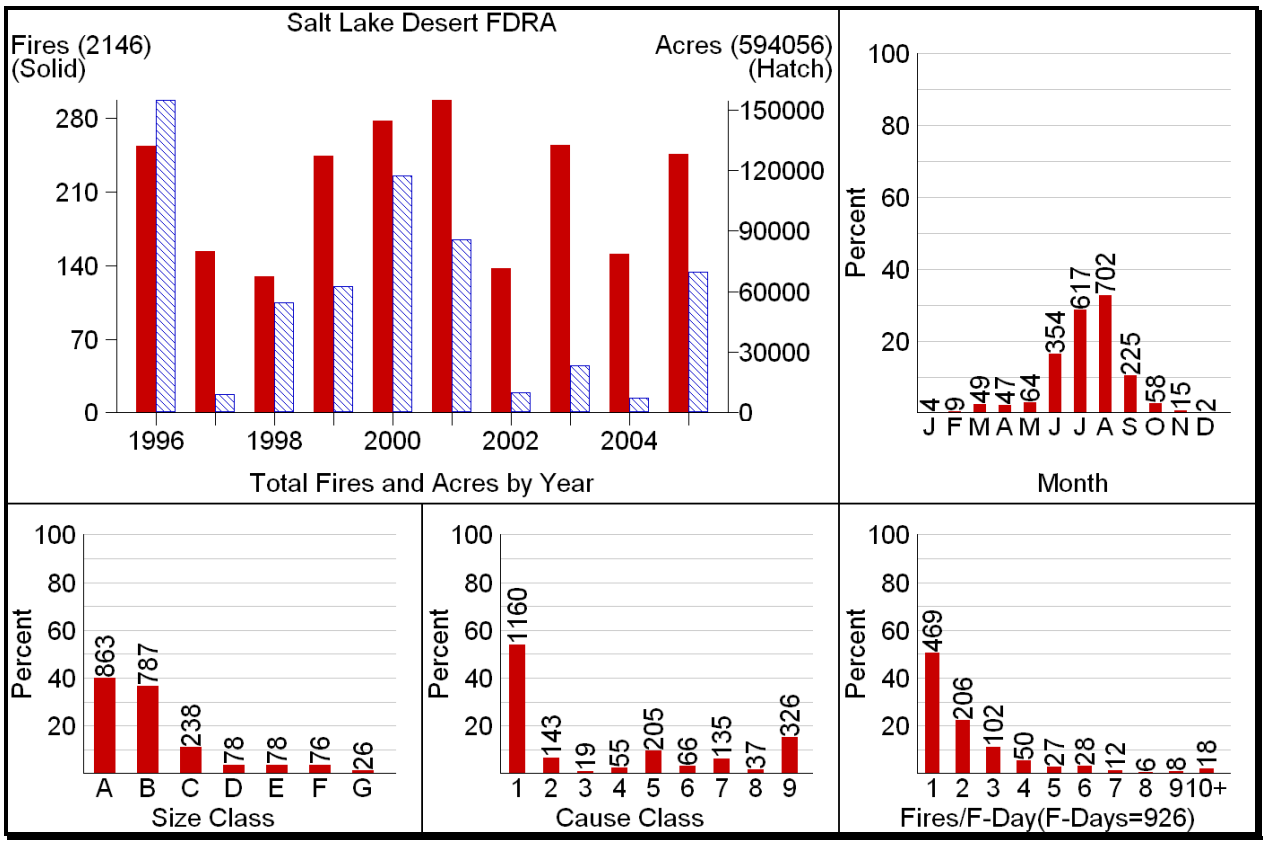
Station ID	Station Name	Status	Agency/Owner	WIMS Data Years	Elevation
104103	Moberg Canyon	Active	USFS-ID-STF	1982-present	6400
104203	Flint Creek	Active	USFS-ID-CAF	1985-present	5200
104204	Hansel Mountain	Inactive	BLM-ID-BUD	1990-1996	5890
260308	Spring Gulch	Active	BLM-NV-EKD	1990-present	5500
260309	Rock Spring Creek	Active	BLM-NV-EKD	1990-present	5380
260805	Cedar Pass	Active	BLM-NV-ELD	1989-present	7185
420103	Red Dome	Inactive	BLM-UT-SLD	1979-1998	4720
420201	Card	Inactive	USFS-UT-WCF	1964-1997	5200
420403	Beus Canyon	Active	USFS-UT-WCF	1993-present	5100
420601	Ensign	Inactive	USFS-UT-WCF	1983-1997	5600
420703	Bear River	Active	USFS-UT-WCF	1983-present	8475
420705	Hewnta	Active	USFS-UT-WCF	1984-present	6500
420706	Norway Flat	Active	USFS-UT-WCF	1983-present	8200
420901	Cedar Mountain	Active	BLM-UT-SLD	1965-present	4820
420907	Skunk Ridge	Inactive	BLM-UT-SLD	1987-1996	4550
420908	Vernon	Active	BLM-UT-SLD	1990-present	5500
420909	Muskrat	Inactive	BLM-UT-SLD	1993-1996	4400
420910	Simpson Springs	Inactive	BLM-UT-SLD	1993-1996	4900
420911	Aragonite	Active	BLM-UT-SLD	1997-present	5080
420912	Otter Creek	Active	BLM-UT-SLD	2002-present	7160
420914	Rosebud	Active	BLM-UT-SLD	2002-present	5040
420915	Clifton Flat	Active	BLM-UT-SLD	2003-present	6384
421101	Pleasant Grove	Active	USFS-UT-UIF	1970-present	5200
421103	Rays Valley	Active	USFS-UT-UIF	1983-present	7300
421202	West Fork	Inactive	USFS-UT-UIF	1987-1996	8400
421501	Sevier Reservoir	Active	USFS-UT-RID	1987-present	5330
421502	Mud Spring	Active	BLM-UT-RID	1990-present	5760
481801	Muddy Creek	Active	BLM-WY-RID	1983-present	6970

E. Statistical Analysis

1. Fire History

The most recent ten years (1996-2005) of fire history data was obtained from the three agencies (BLM, USFS, State of Utah). BLM fire data was obtained from the Wildland Fire Management Information web site. USFS fire data was obtained from NIFMID. State of Utah data was obtained from their computer database. Since all three agencies may have reported the same fire in their respective databases, the fires were cross-referenced and duplicate fires were eliminated (where possible). FireFamily Plus software was utilized to produce statistics and graphs. A more detailed fire occurrence workload analysis (by agency) is in Appendix K.

a) Salt Lake Desert FDRA



Size Class:

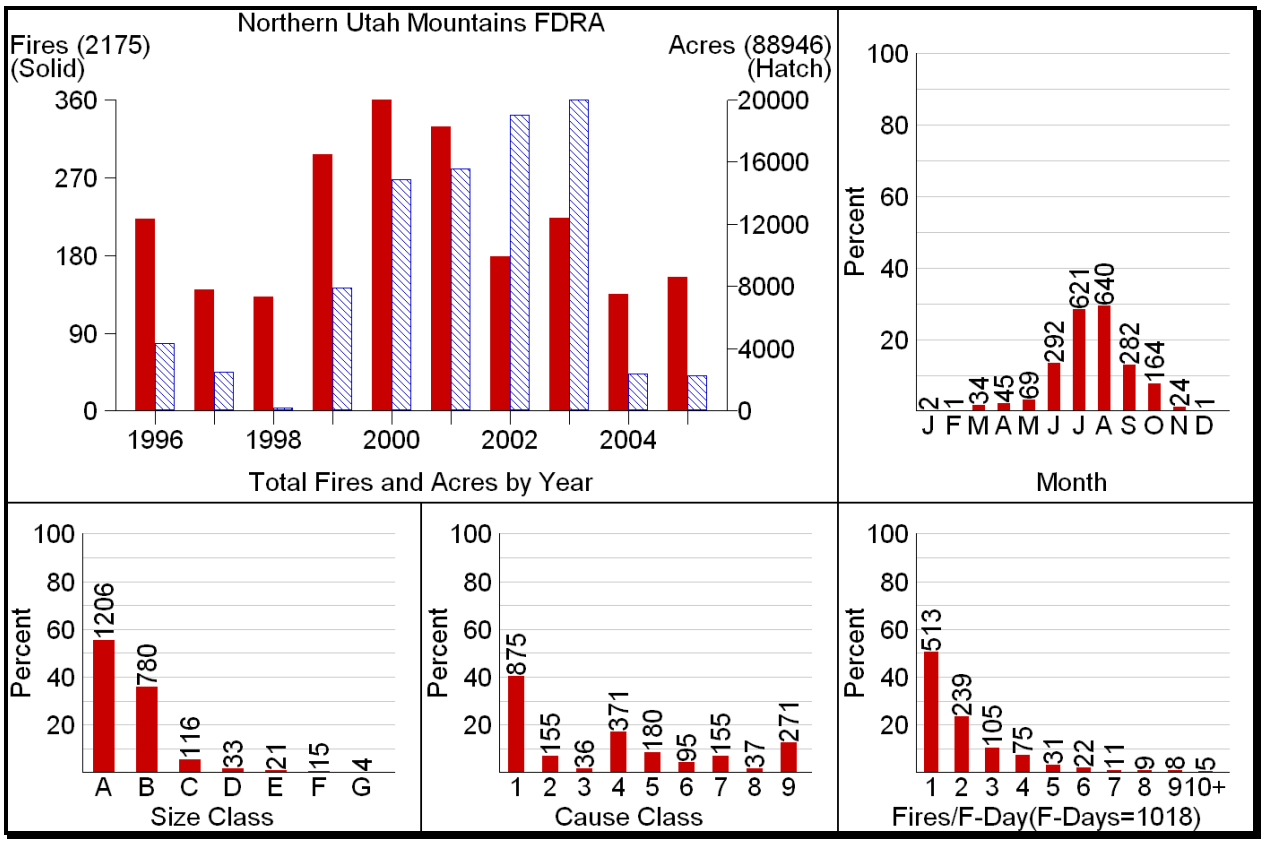
A = 0 - .2 acres
B = .3 - 9 acres
C = 10 - 99 acres
D = 100 - 299 acres
E = 300 - 999 acres
F = 1000 - 5000 acres
G = > 5000 acres

Cause Class:

1 = Lightning
2 = Equipment
3 = Smoking
4 = Campfire
5 = Debris Burning
6 = Railroad
7 = Arson
8 = Children
9 = Miscellaneous

Fires per Fire-day

b) Northern Utah Mountain FDRA



Size Class:

A = 0 - .2 acres
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G = > 5000 acres

Cause Class:

1 = Lightning
2 = Equipment
3 = Smoking
4 = Campfire
5 = Debris Burning
6 = Railroad
7 = Arson
8 = Children
9 = Miscellaneous

Fires per Fire-day

2. Preparedness Level Breakpoints

A break point is a threshold which corresponds to a change in historical fire activity. Preparedness levels differ from adjective fire danger ratings because they take fire history into account in addition to weather data.

a) The Fire Family Plus software package was used to establish the fire business breakpoints. A statistical analysis based on historical weather adjusted for fire activity determines the appropriate staffing index and associated break points for each FDRA. Refer to Appendix J for information regarding the Firefamily Plus analysis.

Preparedness Level: Fire Family Plus Analysis Factors and Determinations							
Rating Area	**RAWS**	**Data Years Used**	**Weighting Factor**	**Fuel Model**	**NFDRS Index**	**Fire Business Break Point Ranges**	
Salt Lake Desert	**SIG:** **Cedar Mountain** **Vernon** **Aragonite** **Rosebud**	 **1980 - 2005** **1990 - 2005** **1993 - 2005** **2002 - 2005**	 **1** **1** **1** **1**	**G**	**ERC**	**PL 1** **PL 2** **PL 3** **PL 4** **PL 5**	**00 – 44** **45 – 56** **57 – 69** **70 – 84** **85 +**
Northern Utah Mountains	**SIG:** **Rays Valley** **Pleasant Grove** **Norway Flat** **Bear River** **Beus Canyon**	 **1983 - 2005** **1980 - 2005** **1983 - 2005** **1980 - 2005** **1993 - 2005**	 **1** **1** **1** **1** **1**	**G**	**ERC**	**PL 1** **PL 2** **PL 3** **PL 4** **PL 5**	**00 – 36** **37 – 49** **50 – 61** **62 – 73** **74 +**

The final preparedness level determination will also incorporate fire activity, fire weather advisories, Haines Index, and a measure of Ignition Risk. Daily index/component values will be obtained from WIMS and used in preparedness and dispatch level worksheets.

3. Dispatch Level Breakpoints

Dispatch Level: Fire Family Plus Analysis Factors and Determinations							
Rating Area	**RAWS**	**Data Years Used**	**Weight Factor**	**Fuel Model**	**NFDRS Index**	**Fire Business Break Point Ranges**	
Salt Lake Desert	**SIG:** **Cedar Mountain** **Vernon** **Aragonite** **Rosebud**	 **1980 - 2005** **1990 - 2005** **1993 - 2005** **2002 - 2005**	 **1** **1** **1** **1**	**G**	**BI**	**Low** **Moderate** **High** **Extreme**	**00 – 32** **33 – 59** **60 – 80** **81 +**
Northern Utah Mountains	**SIG:** **Rays Valley** **Pleasant Grove** **Norway Flat** **Bear River** **Beus Canyon**	 **1983 - 2005** **1980 - 2005** **1983 - 2005** **1980 - 2005** **1993 - 2005**	 **1** **1** **1** **1** **1**	**G**	**BI**	**Low** **Moderate** **High** **Extreme**	**00 – 38** **39 – 54** **55 – 67** **68 +**

4. Adjective Fire Danger Rating (AFDR) Break Points

Adjective fire danger break points are based on staffing classes (divisions of fire danger) and a staffing index/component (BI or ERC). Adjective rating will be based upon the seasonal climatic breakpoints. Climatological breakpoints are points on the cumulative distribution of one fire weather/fire danger index without regard to associated fire occurrence/business. For example, the value of the 90th percentile ERC is the climatological breakpoint at which only 10 percent of the ERC values are greater. The percentiles for clamatological breakpoints are predetermined by agency directive. The BLM uses the 80th and 95th percentiles;

the USFS uses the 90th and 97th percentiles. The Salt Lake Desert FDRA will use the BLM's percentiles and the Northern Utah Mountains FDRA will use the USFS percentiles for adjective fire danger ratings. These values have been entered into WIMS.

Five staffing class intervals (1-5) that correspond with five levels of adjective fire danger: low, moderate, high, very high, and extreme will be used for both FDRA's.

Salt Lake Desert FDRA

Input Information			**Staffing Class and Percentile Break Points**	
RAWS	**Fuel Model**	**Staffing Index**	**80th**	**95th**
Cedar Mt. (420901)	G	ERC	86	95
Vernon (420908)	G	ERC	84	93
Aragonite (420911)	G	ERC	96	104
Rosebud (420914)	G	ERC	91	101

Northern Utah Mountains FDRA

Input Information			**Staffing Class and Percentile Break Points**	
RAWS	**Fuel Model**	**Staffing Index**	**90th**	**97th**
Rays Valley (421103)	G	ERC	84	91
Pleasant Grove (421101)	G	ERC	91	96
Norway Flat (420706)	G	ERC	73	82
Bear River (420703)	G	ERC	68	76
Beus Canyon (420403)	G	ERC	85	91

IV. Applications

The National Fire Danger Rating System (NFDRS) utilizes the WIMS processor to manipulate weather data and forecasted data stored in the NIFMID database to produce fire danger ratings for corresponding weather stations (RAWS). NFDRS outputs from the WIMS processor can be used to determine various levels of fire danger rating. The system is designed to calculate worst-case scenario fire danger. NFDRS will be utilized in three ways for the purpose of this plan. The **Preparedness Level**, which will help agency personnel determine an appropriate state of readiness of suppression forces. The **Dispatch Level** is a function of Burning Index, and is a decision tool for dispatchers to assign initial attack resources to reported fires. The third utilization of NFDRS is to compute the **Adjective Fire Danger** for the purpose of communicating fire danger to public and industrial interests.

Worksheets (flowcharts) will be used to determine the daily preparedness and dispatch levels. The resultant preparedness and dispatch levels for the different FDRA's will be broadcast in conjunction with the morning information report and documented on the daily resource status report. The adjective fire danger ratings will be broadcast and documented in the same manner.

Although fire danger ratings do not prevent human-caused fires, a strong effort should be made to communicate the fire danger as it changes throughout the fire season. The social, political, and financial impacts of wildfires on agency, public, and industrial entities can be far reaching. Loss of life, property, and financial resources can potentially be associated with any wildfire. As the fire danger fluctuates, agency personnel need to have pre-planned and appropriate responses. These actions should not only focus on appropriate fire suppression, but also mitigation/education.

A. Preparedness Level

The preparedness level is a five-tier (1-5) fire danger rating system that will be based on Energy Release Component and indicators of fire business. The fire business indicators used to calculate the preparedness level include an indication of fire activity, Red Flag Warnings or Fire Weather Watches, Haines Index, and a measure of Ignition Risk. A flow chart guides personnel through the process. Several procedures and guidelines are to be followed once the preparedness level has been determined. The break points for the planning level are set using an historical analysis (Fire Family Plus) of fire business and its relationship to 1300 RAWS observations entered into the NIFMID database and processed by WIMS, which calculates the staffing index values (BI, IC, SC, ERC, etc).

Worksheet Instructions:

1. **Staffing Index Value:** Place a checkmark in row one indicating the forecasted staffing index/component range. These indices (forecasted by the Salt Lake Weather Office) are based on the 1300 RAWS observations which are input to the WIMS processor by NUIFC personnel.
2. **Haines Index:** Place a checkmark in row two indicating the forecasted Haines Index Range.
3. **Red Flag Warning or Fire Weather Watch:** Place a checkmark in row three based on the presence of these advisories issued by the National Weather Service.
4. **Ignition Risk:** Place a checkmark in row four to indicate the relative risk of human and/or naturally caused ignitions. Human-caused risk is based upon activities such as holidays or special events occurring within the FDRA. During holiday weekends (July 4th, July 24th, Labor Day) or special events, the ignition risk is "High;" otherwise, it is "Low." Lightning Activity Level (LAL) would be the basis for relative risk for natural ignitions; a forecasted LAL of 1 is "Low" ignition risk; 2 through 6 is "High". If multiple LALs are forecasted within the FDRA, use the highest LAL forecasted for that FDRA to complete the worksheet on row four.
5. **Fire Activity:** fire activity can be defined as any fire within the Northern Utah Interagency Dispatch Area (regardless of FDRA) that requires the commitment of a Federal ground or aviation resource. Place a checkmark in the appropriate box in row five.

Preparedness Level Worksheet
Northern Utah Interagency Fire Center

	ERC - Model G (SL Desert FDRA)	**0 - 44**		**45- 56**		**57 - 69**		**70 - 84**		**85 Plus**	
	ERC - Model G (N Utah Mtns FDRA)	**0 – 36**		**37 – 49**		**50 – 61**		**62 -73**		**74 Plus**	
1	✓ ⇨										
	Haines Index	**2-4 ⇩**	**5-6 ⇩**	**2-4 ⇩**	**5-6 ⇩**	**2-4 ⇩**	**5-6 ⇩**	**2-4 ⇩**	**5-6 ⇩**	**2-6 ⇩**	
2	✓ ⇨										
	Red Flag Warning Fire Wx Watch	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**
3	✓ ⇨										
	Ignition Risk	**Low-High ⇩**	**Low ⇩**	**High ⇩**	**Low ⇩**	**High ⇩**	**Low ⇩**	**High ⇩**	**Low ⇩**	**High ⇩**	**Low ⇩**	**High ⇩**
4	✓ ⇨										
	Fire Activity	**Yes or No ⇩**		**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**No ⇩**	**Yes ⇩**	**Yes or No ⇩**
5	✓ ⇨										
	Preparedness Level	**I**			**II**		**III**		**IV**		**V**

B. Dispatch Level

Agency personnel use the dispatch level (response level) to assign initial attack resources based on pre-planned interagency "Run Cards". Combined with predefined Dispatch Zones, the Dispatch Level is used to assign an appropriate mix of suppression resources to a reported wildland fire based upon fire danger potential. The dispatch levels are derived from the most appropriate NFDRS index and/or component that correlate to fire occurrence. In both FDRAs, Burning Index (BI) in NFDRS Fuel Model G has been determined to be the best NFDRS index that statistically correlates to the potential for large fires to occur. Due to the ability of BI to reflect the most current fire danger potential, and the Dispatch Center's ability to manage agency personnel throughout the course of any given day, BI will be computed and implemented for initial attack response levels until a qualified Incident Commander arrives on scene to validate the need for the dispatched resources.

Dispatch Level Worksheet
Northern Utah Interagency Fire Center

FDRA				
BI - Model G (SL Desert FDRA)	**0 - 32**	**33 - 59**	**60 - 80**	**81 plus**
BI - Model G (N Utah Mtns FDRA)	**0 – 38**	**39 – 54**	**55 – 67**	**68 plus**
Dispatch Level	**LOW**	**MODERATE**	**HIGH**	**EXTREME**

C. Adjective Fire Danger Rating

1. Adjective Fire Danger Rating Description

In 1974, the Forest Service, Bureau of Land Management and State Forestry organizations established a standard adjective description for five levels of fire danger for use in public information releases and fire prevention signing. For this purpose only, fire danger is expressed using the adjective levels and color codes described below.

Fire Danger Class and Color Code	Description
Low (L) (Green)	Fuels do not ignite readily from small firebrands, although a more intense heat source such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
Moderate (M) (Blue)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H) (Yellow)	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are hit hard and fast while small.
Very High (VH) (Orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn in heavier fuels.
Extreme (E) (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessons.

The resultant adjective fire danger information will be used by agency personnel to maintain the awareness of public and industrial entities. The amount of interaction will depend on the magnitude of the adjective fire danger.

2. Adjective Fire Danger Rating Determination

NFDRS processors automatically calculate the adjective class rating. The adjective rating calculations are keyed off the first priority fuel model listed in the station record in the processor. It uses the staffing index (such as ERC or BI) the

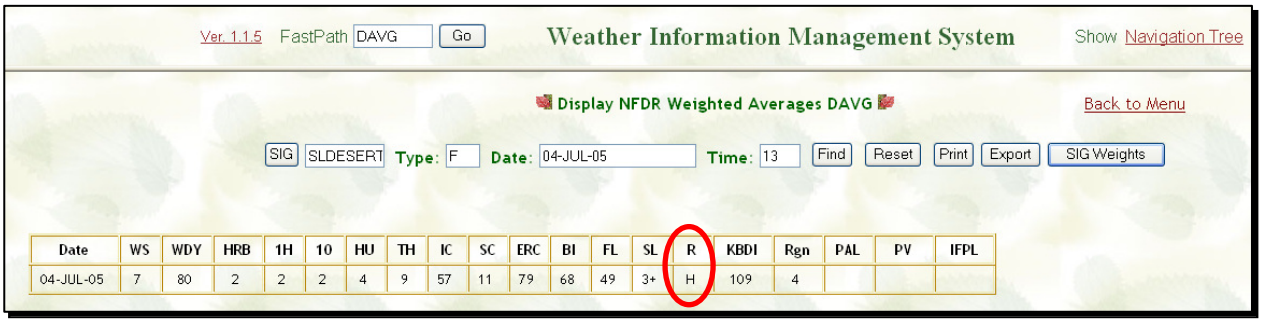
user associates with the first fuel model/slope/grass type/climate class combination.

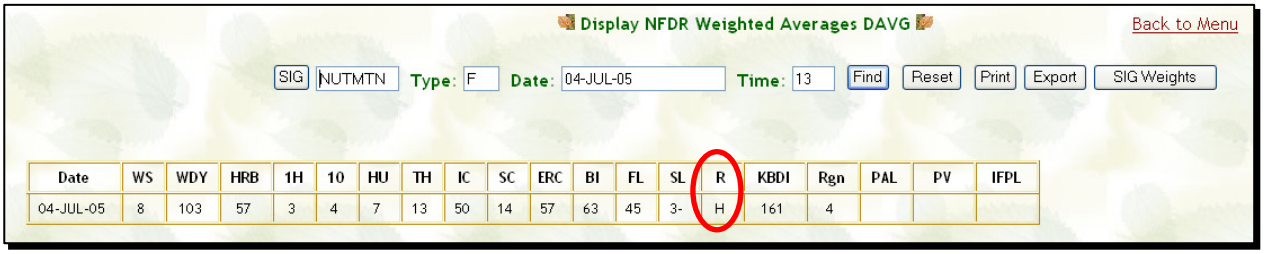
The actual determination of the daily adjective rating is based on the current or predicted value for a user selected staffing index and ignition component using the table below.

Staffing Levels	Adjective Fire Danger Rating				
1-, 1, 1+	**L**	**L**	**L**	**M**	**M**
2-, 2, 2+	**L**	**M**	**M**	**M**	**H**
3-, 3, 3+	**M**	**M**	**H**	**H**	**VH**
4-, 4, 4+	**M**	**H**	**VH**	**VH**	**E**
5	**H**	**VH**	**VH**	**E**	**E**
Ignition Component	**0-20**	**21-45**	**46-65**	**66-80**	**81-100**

Given the same weather inputs, the NFDRS processor will calculate the adjective fire danger for selected fuel models.

The adjective fire danger rating for the Salt Lake Desert FDRA is a weighted average of weather observations between the Vernon (420908), Cedar Mountain (420901), Aragonite (420911) and Rosebud (420912) RAWS. A Special Interest Group (SIG) has been created in WIMS that combines the data from these three stations using the first priority NFDRS fuel model from each station catalog. The data is accessed using the WIMS "DAVG" command and entering the SIG name in the query box. If a forecasted adjective fire danger rating is required, enter "F" in the "type" query block. The fire danger for the Northern Utah Mountains is determined by querying the SIG of Bear River (420703), Norway Flat (420706), Pleasant Grove (421101), Rays Valley (421103), and Beus Canyon (420403) RAWS. The example below displays the forecasted 1300 adjective fire danger (R)ating of (L)ow for July 4th.





D. Seasonal Risk Analysis

Seasonal risk analysis is a comparison of the historic weather/fuels records with current and forecasted weather/fuels information. Seasonal risk analysis is an on-going responsibility for fire program managers. The most reliable indicators of seasonal fire severity have been measurements of fine fuel loading, live fuel moisture, 1000-hour (dead) fuel moisture, and ERC. These levels will be graphically compared to historical maximum values and the average; these graphs will be routinely updated and distributed to fire suppression personnel and dispatch. Seasonal risk analysis information will be used as a basis for pre-positioning critical resources, dispatching resources, and requesting fire severity funding. It has been proven that specific indicators are most useful to predict fire season severity and duration in the Salt Lake Desert and Northern Utah Mountains Fire Danger Rating Areas

1. Key Factors and Trends

a) Fire Activity: The presence (or absence) of fire activity can be tracked and compared to historical occurrences in order to anticipate severity conditions. The Fire Summary module of Fire Family Plus provides an efficient means to compare monthly fire activity.

b) Live Fuel Moisture: Live woody (juniper) and herbaceous (sagebrush) fuel moisture plots were established in the vicinity of the Vernon (1996) and Muskrat (1995) fire stations. Since that time, valuable data has been collected and a direct correlation has been drawn between fire intensity (controllability) and live moisture levels. Consequently, fire severity is determined by comparing current trends to historical averages. Although live woody (oak brush) samples have been collected in the Northern Utah Mountains FDRA for the past several years, there has not been a formalized monitoring program in place. The Wasatch-Cache and Uinta National Forests are in the process of developing a fuels monitoring program, which will include live fuel moisture. Comparison of fuel moisture to historical conditions at various locations within the Utah and surrounding areas can be located on the Eastern Great Basin web site: http://www.blm.gov/utah/egbcc/php/lfm/public/index.php

c) Fine Fuel Loading: There are six fine dead fuel load plots located in the Salt Lake Desert FDRA. Fuel load determinations are made on an annual basis and compared to historical averages in order to determine the potential intensity of wildfires. The Wasatch-Cache and Uinta National Forests are in the process of developing a fuels monitoring program. It is unknown at this time whether the program will include an assessment of fine dead fuel loading.

d) NFDRS Indicators: ERC and 1000-hr (3" – 8" diameter dead) fuel are used as the primary indicators to track seasonal trends of fire danger potential. NFDRS fuel model G has been chosen due to its good "fit" with the ERC and 1000-hour models. Other fuel models which might seem to be more

appropriate due to their classification (grass/brush) do not correlate very well statistically with the NFDRS models. Consequently, fuel model G was chosen due to its ability to predict fire occurrence; specifically, a day when a large fire is likely to occur.

e) Weather Trends: Seasonal weather assessments rely upon long-range (30-90 day) forecasts. This information is available in two formats; seasonal long-lead outlooks and 30-90 day outlooks. This information is provided by NOAA Climate Predication Center.

f) Drought Indicators: The Keetch-Byrum Drought Index (KBDI) and Palmer Drought Index track soil moisture and have been tailored to meet the needs of fire risk assessment personnel. Current KBDI information is located on the Wildfire Assessment System (WFAS) Internet site (http://www.wfas.us). Tracking and comparing 1000-hour fuel moisture is another method to assess drought conditions.

g) Normalized Difference Vegetation Index (NDVI): NDVI data is satellite imagery, which displays vegetative growth and curing rates of live fuels. The WFAS Internet site (http://www.wfas.us) provides several different ways to analyze current and historical greenness imagery, which can be a significant contributor to seasonal risk assessments.

h) **Season Ending Event:**

Historical fire records where examined for both FDRA's to determine the combination of weather parameters which would indicate the end of the fire season. The following season-ending events have been identified:

Salt Lake Desert FDRA: five consecutive days when the BI (fuel model G) has been less than 29 **and** ERC less than 45 (**or** measurable precipitation has occurred for at least a sum of 21 hours) during that five-day period.

Northern Utah Mountains FDRA: five consecutive days when the BI (fuel model G) has been less than 40 **and** ERC less than 42 **and** measurable precipitation has occurred for at least a sum of 16 hours (**or** measurable precipitation has occurred for at least a sum of 25 hours) during that five-day period.

Utilizing the Term Module of the Rare Event Risk Assessment Process (RERAP) software, the Weibull waiting-time distribution was developed from historical season-ending dates. Appendix I displays these probability graphs along with the *event locator* parameters from the FireFamily Plus software dialog box. From this analysis, it can be estimated that there is an equal probability of a season-ending event occurring before or after the 50^{th} percentile date. For the Salt Lake Desert FDRA, this occurs near October 12^{th}; for the Northern Utah Mountains FDRA, this occurs near October 3^{rd}.

E. Thresholds (Extreme Fire Danger)

Seasonal risk escalation in fuel complexes of Northern Utah relies upon a combination of factors, which will ultimately trigger an extreme state of fuel volatility and a high potential for large fire growth or multiple ignition scenarios.

1. **Fire Activity:** The occurrence of large/multiple fires is the best indicator of severity conditions and the potential for seasonal risk. Any one incident reaching type one or two complexity would be an indicator of severity. Two or more type three incidents within a two to four week period would also be a strong indicator. Three or more initial attack fires in the same day indicate a point where resources are scarce. A progressive approach to assessing seasonal risk will prepare the local unit for these occurrences and the necessary tools will already be in place.
2. **Live Fuel Moisture (Juniper):** The average woody fuel moisture of juniper typically fluctuates between 100% (June) and 75% (August). Any readings below 80% indicate increased risk relating to large fire growth and severity conditions. Below average readings may indicate an early or extended fire season.
3. **Live Fuel Moisture (Sagebrush):** The average herbaceous fuel moisture of sagebrush in the Salt Lake Desert, fluctuates between 200% (June) and 80% (August). Readings below 80% indicate increased risk relating to large fire growth and severity conditions. Below average readings may indicate an early or extended fire season.
4. **Fine Fuel Loading:** The database for the six fuel load plots (Fuel Model A) is relatively young, (1998). However, fuel loading over .8 tons/acre indicates a fire controllability problem. Several plots hold significant amounts of carry-over fuel, which contributes to continuity and fuel bed density, which will create control problems and increase fireline intensity.
5. **NFDRS Thresholds:** The BI threshold for extreme fire potential is 81 (or higher) for the Salt Lake Desert FDRA; the BI threshold for extreme fire potential is 68 (or higher) for the Northern Utah Mountains FDRA. It has been statistically proven that large fire events will occur proportionally more often when these thresholds are exceeded. The ERC threshold is 85 (or higher) for the Salt Lake Desert FDRA and 74 (or higher) for the Northern Utah Mountains FDRA. Early and late-season readings that trend above average may indicate an extension of the normal fire season.
6. **Weather Thresholds:** The observable weather factors that contribute to large fires and the potential for extreme fire behavior can be determined from the same percentiles determined from NFDRS thresholds. Any of these factors significantly increase the potential for extreme fire behavior and large fire growth. Combination of these factors will increase the risk.

Local Thresholds: any of these factors significantly increase the potential for extreme fire behavior. The more factors present, the greater the risk.

	SL Desert FDRA	N Utah FDRA
20-Foot Wind	≥ 12 mph	≥ 10 mph
Relative Humidity	≤ 12 %	≤ 10 %
Temperature	≥ 90 °F	≥ 85 °F

- **Haines Index** of 5 or 6 indicates atmospheric instability and dryness contributing to the significant probability of extreme fire behavior (crowning, spotting, and plume dominated fires).
- **Live Fuel Moisture** less than 80% indicates severe dryness of living fuels which will readily contribute to extreme fire intensity.
- **Lake Effect ("Sea Breeze") Winds** will enhance downslope winds and erratic fire behavior after sunset adjacent to the Great Salt Lake and Utah Lake.

7. **Drought Indicators:** Palmer Drought Index graphics display current drought conditions while KBDI values of 500-800 indicate the potential for rapid curing and drying of the fine fuels and potential for live fuel moisture to drop. The 1000-hour fuel moisture is also a good drought indicator. Values between six and ten percent indicate the potential risk for extreme burning conditions.
8. **NDVI:** An analysis of this imagery will assist in the assessment of current fuel moisture conditions and provide historical as well as average greenness comparisons. The Windisp 3 software (WFAS Internet site) program is utilized to develop detailed, region-specific greenness maps.

F. Fire Danger Pocket Cards

The Fire Danger Pocket Card is a tool, which can aid fire suppression personnel to interpret NFDRS outputs and understand local fire danger thresholds for a local area. Pocket cards can relate current NFDRS outputs with the historical average and worst-case values in a specific geographic location. Visiting resources can use the pocket card to familiarize themselves with local fire danger conditions.

Burning Index as a measure of fire controllability (Deeming et al. 1978). NFDRS fuel model G was selected for both fire danger rating areas as it provides the best statistical correlation with large fire occurrence and responds quickly to changing weather and fuel conditions. Refer to Appendix H for an example.

G. Roles and Responsibilities

1. **Fire Danger Operating and Preparedness Plan:** The Northern Utah Interagency Fire Center (NUIFC) manager will ensure that necessary amendments or updates to this plan are completed. Updates to this plan will be made at least every two years and approved by the line officers (or delegates) from each agency. Revised copies will be distributed to the individuals on the primary distribution list.
2. **Suppression Resources:** During periods when local preparedness levels are High to Extreme, the Fire Management Officers from each agency will strive to achieve the most efficient and effective organization to meet Fire Management

Plan objectives. This may require the pre-positioning of suppression resources. The FMO/AFMO from each agency will also determine the need to request/release off unit resources or support personnel throughout the fire season.

3. **Duty Officer:** For the purposes of this plan, a Duty Officer from each agency will be identified to the Northern Utah Interagency Fire Center Manager. The Duty Officer is a designated fire operations specialist, who provides input and guidance regarding preparedness and dispatch levels. It is the Duty Officer's role to interpret and modify the daily preparedness and dispatch levels as required by factors not addressed by this plan. Modifications of the preparedness and/or dispatch levels must be coordinated through the Fire Center Manager. The Duty Officer will keep their respective agency's fire and management staff updated (as needed).
4. **Fire Weather Forecasting:** Daily fire weather forecasts will be developed by the National Weather Service, Salt Lake Fire Weather Forecast Office, and posted on the Internet and in WIMS for the Northern Utah Interagency Fire Center (NUIFC) to retrieve.
5. **NFDRS Outputs and Indices:** The NUIFC Manager will ensure that the daily fire weather forecast (including NFDRS indices) is retrieved and that the daily preparedness, dispatch, and adjective levels are calculated and distributed.
6. **Risk Analysis Information:** The FMO from each agency will ensure that seasonal risk assessments are conducted monthly during the fire season. The risk analysis will include information such as live fuel moisture, 1000-hour fuel moisture, fuel loading, NFDRS (BI/IC/ERC) trends, NDVI imagery, and other pertinent data. This information will be distributed to agency staff and the NUIFC Manager. The NUIFC Manager and AFMO's will ensure information is posted at fire suppression duty stations.
7. **Weather Station Maintenance:** The Remote Sensing Laboratory located at the National Interagency Fire Center (NIFC) maintains and calibrates the BLM RAWS stations on an annual basis. The BLM Fire Station Managers and AFMO are currently qualified as first responders to RAWS malfunctions. The Salt Lake Interagency Fire Cache Manager is responsible for maintaining and calibrating the USFS RAWS stations on an annual basis. Currently, the Cache Manager is also qualified as a first responder for RAWS malfunctions.
8. **WIMS Access, Daily Observations, and Station Catalog Editing:** The BLM FMO is listed as the station owner for the BLM RAWS. The NUIFC Manager is listed as the station owner for the Wasatch-Cache and Uinta National Forest RAWS. The owner maintains the WIMS Access Control List (ACL). The station owner will ensure appropriate editing of the RAWS catalogs. The NUIFC Manager will ensure the timely editing of daily 1300 weather observations of all stations.
9. **Preparedness, Dispatch, and Adjective Level Guidelines:** Each agency's fire management staff along with the NUIFC Manager will be responsible for

establishing and reviewing the preparedness, dispatch, and adjective level guidelines on a bi-annual basis (as a minimum).

10. **Public and Industrial Awareness:** Education and mitigation programs will be implemented by the agency Public Information Officers, Law Enforcement Officers, FMO's, AFMO's, Fire Wardens, and Fire Education/Mitigation Specialists based on Preparedness Level Guidelines and direction provided by the agency's FMO and Duty Officer.
11. **NFDRS and Adjective Fire Danger Break Points:** The FDOP team will review weather and fire data at least every two years (when the FDOP is re-analyzed). The team will ensure that the break points reflect the most accurate information with the concurrence of the FMO's.
12. **Fire Danger Pocket Cards:** The FMO's will ensure that pocket cards are prepared at least every two years and are in compliance with NWCG standards. The cards will be distributed to all interagency, local and incoming firefighters and Incident Management Teams (IMTs). The pocket cards will be posted on the NUIFC and National Wildfire Coordinating Group (NWCG) pocket card web site (http://famweb.nwcg.gov/pocketcards/default.htm). Fire suppression supervisors will utilize pockets cards to train and brief suppression personnel ensuring that they are posted at their respective fire stations.

V. Program Improvements

A. Training

1. Provide FDOP training to cooperators including County fire wardens, cooperating dispatch centers, and military fire departments.
2. Train more personnel as first responders to RAWS malfunctions.
3. Establish local WIMS/NFDRS training courses for agency personnel.
4. Emphasize NFDRS training (S-491) at the geographic area level for mid-level fire management personnel.
5. Inform agency fire suppression supervisors of FDOP applications by integrating the training in unit orientation and "Red Card" meetings. At a minimum, this should include Fire Management Officers, Fire Operations Supervisors, Area Managers, and Fire Wardens.

B. RAWS

1. Program Ray's Valley DCP to transmit hourly (currently transmits at 2 hour intervals).
2. Find and input missing weather data.
3. Perform an in depth analysis of data from USFS weather stations that were excluded from this analysis due to poor quality data. Compare weather station data to other data sources to determine usefulness of data.
4. Explore the possibility of hiring the NIFC RAWS personnel to provide annual maintenance of USFS weather stations.

C. Technology & Information Management

1. Integrate preparedness level flow chart into a software package.
2. Improve the NUIFC Internet Site where pertinent seasonal risk assessment information can be reviewed.